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## THE DETERMINATION OF ULTIMATE STANDARDS OF QUALITY IN HANDWRITING FOR THE PUBLIC SCHOOLS

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It is now a commonplace to say that the advent of scales and tests for the measurement of abilities in the school subjects is making it possible for those in charge of the schools to set up definite standards of attainment. Even those only slightly in touch with the literature and practices of measurement have met with efforts at the establishment of standards by the use of these tests and scales. Occasionally the standards set are almost purely arbitrary, as, for example, when a superintendent of the writer's acquaintance, on the basis of well-nigh unsubstantiated opinion, determined that all pupils of the eighth grades in his system must attain the quality represented by 90 on the Ayres Measuring Scale for Handwriting. More frequently these standards are determined by the average or median abilities of large numbers of school children, as when we say that the standard of accuracy in subtraction in the seventh grade in a certain set of problems should be 86 per cent because the median accuracy of a large number of seventh-grade pupils in this set of problems has been computed to be 86 per cent. With the former method of determination of standards careful thinkers in education are now out of sympathy. It has regard neither for capacities of children nor for the actual need of the ability in question—two prime considerations. The latter method is much superior to it in that, in so far as the results of the tests approximate the capacities of children under present teaching conditions—and, doubtless, they throw a great deal of light on this—they tell us what children of given ages and grades may be taught to do. But this second mode of standard-setting is inadequate in that it largely leaves out of account what the actual social needs for the particular ability may be. This article constitutes an

illustration of the method of standard-setting which looks into the social need for an ability. It grows out of an investigation into the quality of handwriting actually used and demanded in purely social and in vocational activities.

#### A. THE QUALITY OF HANDWRITING NEEDED FOR SOCIAL CORRESPONDENCE

As implied in the last sentence, for purposes of this investigation the need for handwriting has been studied with respect to the two main classes of use to which it is put: (*a*) the purely social need as illustrated in social correspondence and comprehending most or all of the non-vocational uses we may have for handwriting; (*b*) the vocational need. The former need was investigated (1) by collecting and scoring on the Ayres Measuring Scale for Adult Handwriting specimens of actual social (non-vocational) correspondence written by 1,053 adults in various walks of life, practically all of them of the better-educated middle-class Americans, and (2) by securing and tabulating the judgments of 826 adults as to what they consider adequate and inadequate handwriting for social correspondence. The 1,053 specimens were drawn in part from the writer's social correspondence, but most of them were supplied by students in classes in education in the University of Washington and Ohio State University and by a number of other persons who clipped from such social correspondence as they had received and had at hand parts of pages large enough to be scored and representative of the handwriting of the letters from which they were cut. Each specimen was labeled so as to indicate the sex and occupation of its writer. The latter item was secured for each specimen, not primarily to get at the quality of handwriting needed for the occupation, but to note whether the occupation tends to influence the quality of handwriting in social correspondence. The occupational distribution of the writers of these specimens is presented in the order of their frequency in Table I. One important observation to be made is the wide range of occupations in which the writers are found. This is even somewhat larger than this table indicates, because group 33 itself includes single representatives of 22 occupations, among them a dramatic reader, a dairyman, a hairdresser, a

county officer, a college recorder, a dentist, a miner, a janitor, etc. Groups 1-4 include almost four-fifths of the entire number. The group of students includes exclusively those in higher institutions such as colleges, universities, and normal schools. Group 3 includes for the most part teachers in high and elementary schools, but represents also a total of 48 superintendents, principals, and university

TABLE I

## DISTRIBUTION BY OCCUPATIONS OF THE WRITERS OF THE 1,053 SPECIMENS OF SOCIAL CORRESPONDENCE

1. Students.....	230	18. Y.M.C.A. and Y.W.C.A. workers.....	5
2. Homemakers.....	229	19. Artists.....	4
3. Educational workers.....	224	20. Chemists.....	4
4. Business workers.....	121	21. Social workers.....	4
5. Farmers.....	26	22. Society women.....	4
6. Soldiers.....	18	23. Foresters.....	3
7. Lawyers.....	17	24. Laborers.....	3
8. Nurses.....	16	25. Lumbermen.....	3
9. Engineers.....	14	26. Mechanics.....	3
10. Clubwomen.....	13	27. Telephone operators.....	3
11. Physicians.....	13	28. Electricians.....	2
12. Authors and journalists.....	11	29. Housekeepers.....	2
13. Clergymen.....	9	30. Railroad employees.....	2
14. Musicians.....	8	31. Ranchers.....	2
15. Librarians.....	6	32. Sailors.....	2
16. Dressmakers and milliners..	5	33. Miscellaneous.....	22
17. Matrons in schools.....	5	34. Occupationless and unclassified.....	20
		Total.....	1,053

and normal-school teachers. Among the business workers are to be found stenographers, bookkeepers, bank employees, "merchants," "clerks," accountants, "business men," "business women," etc. Group 9 includes only those in the engineering profession. Under Group 34 have been placed those reported as people of leisure and those whose occupations were not reported.

The distributions in gross numbers and percentages of the scores on the scale that have been assigned to these 1,053 specimens of social correspondence are shown in Table II. The scores assigned

TABLE II  
DISTRIBUTION OF THE SCORES OF 1,053 SPECIMENS OF SOCIAL CORRESPONDENCE

Occupation Groups	Score on the Ayres Measuring Scale for Adult Handwriting										
	20	25	30	35	40	45	50	55	60	65	
Numbers of Specimens	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	
1. Students . . . . .	239	2	0.9	1	0.4	16	7.0	3	1.3	59	21.7
2. Homemakers . . . . .	220	3	1.3	4	1.7	29	12.7	1	0.4	51	22.3
3. Educational workers . . . . .	224	...	...	...	...	19	8.5	5	2.2	28	12.5
4. Business workers . . . . .	121	1	0.8	3	2.4	13	10.7	...	...	22	17.4
5. Farmers . . . . .	26	...	...	...	...	7	26.9	...	...	6	23.1
6. Soldiers . . . . .	18	...	...	...	...	3	16.7	1	5.6	5	27.8
7. Lawyers . . . . .	17	1	5.9	3	17.7	3	17.7	2	11.8	4	23.5
8. Nurses . . . . .	16	1	6.3	...	...	2	12.5	...	...	2	12.5
9. Engineers . . . . .	14	...	...	...	...	1	7.1	1	7.1	3	21.4
10. Clubwomen . . . . .	13	1	7.7	...	...	3	23.1	1	7.7	5	38.5
11. Physicians . . . . .	13	1	7.7	...	...	4	30.8	...	...	3	23.1
12. Authors and journalists . . . . .	11	3	27.3	...	...	3	27.3	...	...	1	9.1
13. Clergymen . . . . .	9	2	22.2	1	11.1	...	2	22.2	...	1	11.1
14. Musicians . . . . .	8	1	12.5	...	...	3	37.5	...	2	25.0	...
15. Librarians . . . . .	6	...	...	...	...	1	16.7	...	1	16.7	...
Groups 16 to 34 . . . . .	98	3	3.1	2	2.0	19	10.2	1	1.0	25	25.5
Totals . . . . .	1053	18	1.7	14	1.3	114	10.8	15	1.4	207	19.7
						2.9	299	28.5	17	1.6	106
							18.6	9	0.9	106	10.1
								3	0.3	23	2.2
									1	0.1	49.5

are tabulated as to occupational groups which are found in the left-hand column. It is to be noted that, because of their limited representation and the fact that no dependable conclusion may be drawn as to quality of handwriting on such small numbers of cases, occupation groups 16 to 32 have been merged for this table with

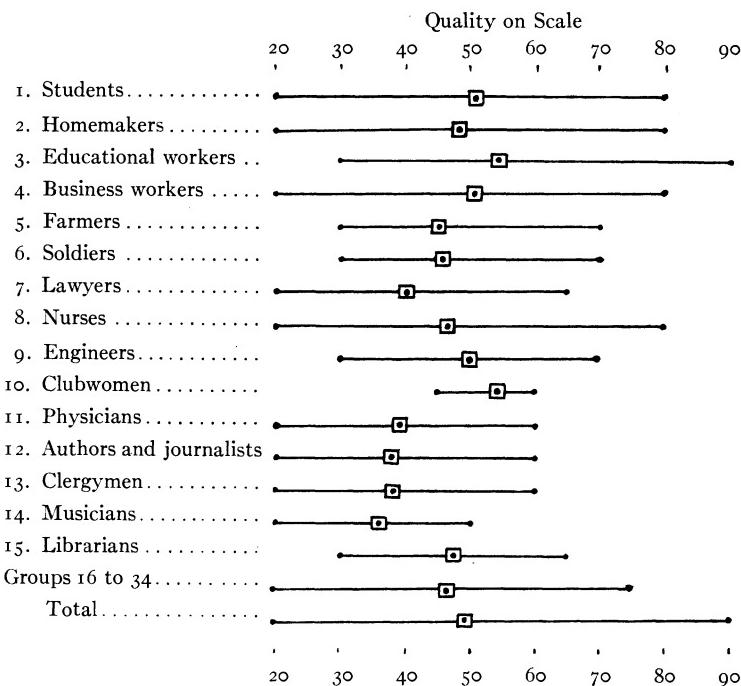


CHART 1.—Ranges and averages of the scores of handwriting done in social correspondence by persons in certain occupational groups. (The lines represent the range of quality shown by the specimens; the squares on these lines locate the averages.)

those in groups 33 and 34. This table shows also in the right-hand column the average score for each group and in the lowest horizontal column the distribution totals for all the 1,053 specimens. Chart 1 shows the range of quality and the place of the average score in this range for each group and for all the specimens.

It will be seen from the totals and percentages at the foot of Table II, and in Chart 2, which presents the same facts in graphic

form, that these qualities tend to pile up in an approximation to the curve of normal frequency, that the most common quality is 50 on the scale, and that the number of cases decreases rapidly and almost symmetrically both above and below this point on the scale. Addition of the numbers and percentages of specimens that have

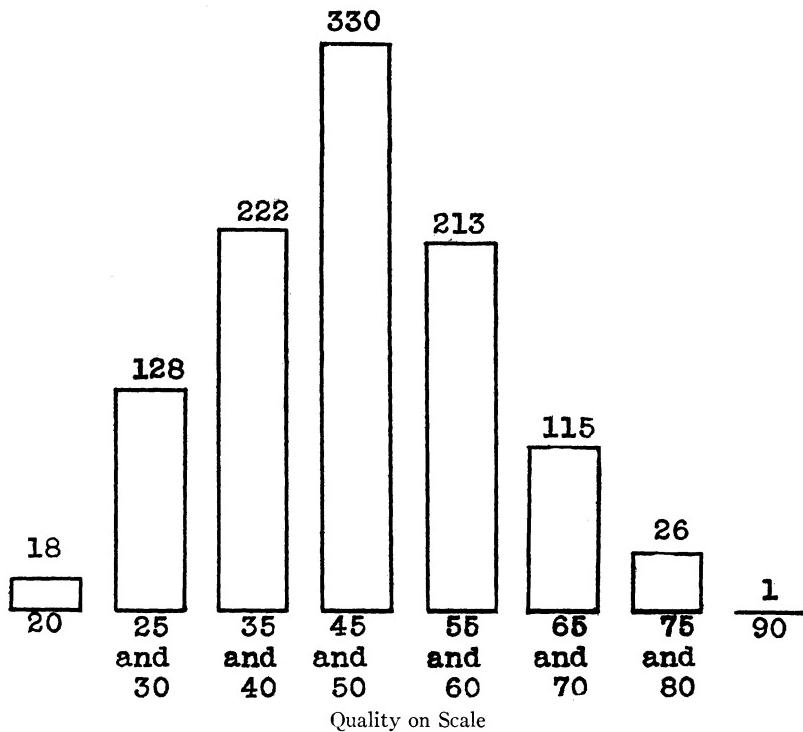


CHART 2.—Distribution of the scores of handwriting of 1,053 specimens of social correspondence.

been scored above 60 on the scale shows that *only 142, or 13.5 per cent of the total of 1,053 correspondents, write better than 60 on the scale, the remaining 86.5 per cent writing at the quality 60 or less. The average quality of the 1,053 specimens is 49.5.* Scrutiny of the percentage distributions for the several occupational groups discovers a number of interesting and significant facts. The only occupational group of the first four large ones which differs markedly

in distribution from the total is that of the educational workers, and the distribution here is somewhat more toward the upper end of the scale, 26.3 per cent of the specimens scoring above the quality 60, i.e., approximately twice as large a percentage as for the entire group of 1,053 specimens. The average for this group of educational workers is 54.3, higher by almost half a step on the scale than for the entire group. The average qualities for the club-women and engineers are approximately as high as for the educational workers, although the range of distribution is not so great, perhaps on account of the smaller number of specimens. The farmer writes about as well as the soldier, and, although the former's average quality is approximately a half step on the scale lower than that for the entire group, the handwriting in his social correspondence is better than that of our representatives of the more honorific professions of the lawyer, physician, writer, clergyman, and musician! However, the number of cases in some of these groups is probably too small to warrant us in drawing final conclusions as to comparative qualities.

In securing the 826 judgments on adequacy and inadequacy of handwriting for purposes of social correspondence, the specimens constituting the Ayres Measuring Scale for Adult Handwriting were used. Each of a large number of copies of the scale was cut into its twenty-four specimens, and these, containing no evidence of the score assigned to it on the scale, were shuffled and submitted to the person who was to judge them. The person judging was directed to place in an envelope marked "adequate" those of the twenty-four specimens which he regarded as adequate for social correspondence and in another envelope marked "inadequate" those which he regarded as inadequate for such a purpose. The judgments were made without consultation with other persons. Very few of the persons passing judgment on these specimens knew of their origin in the scale until after judgment had been made. This is true even of the teachers whose opinions were secured. The 826 judges for purposes of comparison have been placed in three groups: (a) 176 members of classes in education in the University of Washington made up of young men and women preparing for teaching positions (almost exclusively Juniors, Seniors, and graduate

students and including only 8<sup>1</sup> having had teaching experience); (b) 414 teachers in Washington and Ohio (including elementary- and high-school teachers, those in administrative and supervisory positions, 14 in university teaching work, and only 9<sup>1</sup> not having had teaching experience); and (c) 236 other adults, non-teachers, whose judgments were secured for the most part at meetings of parent-teacher associations, women's clubs, etc.

The number of times each of the twenty-four specimens was classed as adequate by the students in education, the teachers, the non-teachers, and the total of 826 judges, and the percentages these are of the number in each group and of the total group, respectively, have been computed and are presented in Table III. This table is to be read as follows: 17, or 9.7 per cent, of 176 students in education judge the specimen assigned the quality A<sub>20</sub> (the poorest of the vertical specimens on the scale) to be adequate for social correspondence; 31, or 17.6 per cent, A<sub>30</sub>, etc. Looking first at the totals in the right-hand column, we note that while slightly less than a third of the entire group of 826 judges are satisfied with A<sub>40</sub>, almost two-thirds consider A<sub>50</sub> and more than three-fourths consider A<sub>60</sub> good enough. Most of the specimens on the vertical section of the scale do not fare so well as do those of the medium-slant and extreme-slant<sup>2</sup> sections, leading us to conclude that the prejudice against the vertical has not yet subsided. The proportions considering each of the specimens adequate are shown again in Chart 3. The averages of the percentages for each quality as given in the right-hand column of Table III, e.g., the averages of the percentages for A<sub>20</sub>, B<sub>20</sub>, and C<sub>20</sub>, have been computed and are presented in Table IV. Chart 4 sets forth these proportions in graphic form.

Before stating conclusions as to an appropriate standard of quality for use in social correspondence, it may be well to call

<sup>1</sup> The judgments of these were tabulated through error in the wrong groups in such a way as to make it impossible later to identify and withdraw them. Their number is so small that they cannot affect the conclusions concerning the groups in which they are placed.

<sup>2</sup> Almost equal percentages of the entire group of 826 judges consider the qualities 40 and 50 on the C or extreme-slant section of the scale adequate, suggesting that the scale is improperly constructed at this point.

attention to the variation in judgment shown by the three groups into which the 826 judges have been separated. A comparison of the percentages of the non-teacher group with those of the other two groups who have considered the specimens of the scale adequate

TABLE III  
NUMBERS AND PERCENTAGES OF THE JUDGES CONSIDERING THE 24 SPECIMENS IN THE  
AYRES MEASURING SCALE FOR ADULT HANDWRITING ADEQUATE FOR  
SOCIAL CORRESPONDENCE

SPECIMEN ON SCALE	STUDENTS IN EDUCATION		EDUCATIONAL WORKERS		NON-TEACHERS		ALL JUDGES	
	No.	Percentage	No.	Percentage	No.	Percentage	No.	Percentage
A 20.....	17	9.7	56	13.5	12	5.1	85	10.3
30.....	31	17.6	82	19.8	14	5.9	127	15.4
40.....	71	40.3	146	35.3	43	18.2	258	31.2
50.....	138	78.4	300	72.5	105	44.4	543	65.7
60.....	158	89.8	343	82.9	127	53.8	628	76.0
70.....	156	88.6	307	88.6	161	68.2	684	82.8
80.....	171	97.2	385	93.0	167	70.8	723	87.5
90.....	173	98.3	392	94.7	195	82.6	760	92.0
B 20.....	2	1.1	18	4.3	4	1.7	24	2.9
30.....	17	9.7	49	11.8	11	4.7	77	9.3
40.....	75	42.6	207	50.0	46	19.5	328	39.7
50.....	145	82.4	296	71.5	100	42.4	541	65.5
60.....	167	94.9	382	92.0	154	65.2	703	85.1
70.....	172	97.7	406	98.1	194	82.2	772	93.5
80.....	173	98.3	412	99.5	217	91.9	802	97.1
90.....	174	98.9	411	99.3	220	93.2	805	97.5
C 20.....	11	6.3	27	6.5	4	1.7	42	5.1
30.....	69	39.2	165	39.9	26	11.0	260	31.5
40.....	116	65.9	226	54.6	67	28.4	409	49.5
50.....	105	59.7	236	57.0	72	30.5	413	50.0
60.....	166	94.3	376	90.8	145	61.4	687	83.2
70.....	168	95.5	384	92.8	175	74.2	727	88.0
80.....	173	98.3	406	98.1	188	79.7	767	92.9
90.....	174	98.9	412	99.5	220	93.2	806	97.6
Total number of judges...	176	.....	414	.....	236	.....	826	.....

shows that in every instance the former is smaller than the latter, i.e., this non-teacher group would in general insist on a somewhat higher quality for social correspondence than would the group of students in education and the teacher group. But even in this group, if we average the percentages who consider the three specimens of the quality 60 adequate, we find that slightly more than

60 per cent, a generous majority, would approve this quality for use in social correspondence. To those who would question the ability of university students in education and of the teachers to

TABLE IV  
AVERAGE PERCENTAGES OF THE 826 JUDGES CONSIDERING THE THREE SPECIMENS OF  
EACH QUALITY ON THE AYRES MEASURING SCALE FOR ADULT HAND-  
WRITING ADEQUATE FOR SOCIAL CORRESPONDENCE

Specimens on Scale	20	30	40	50	60	70	80	90
Average percentage considering the specimens adequate.....	6.1	18.7	40.1	60.4	81.4	88.1	92.5	95.7

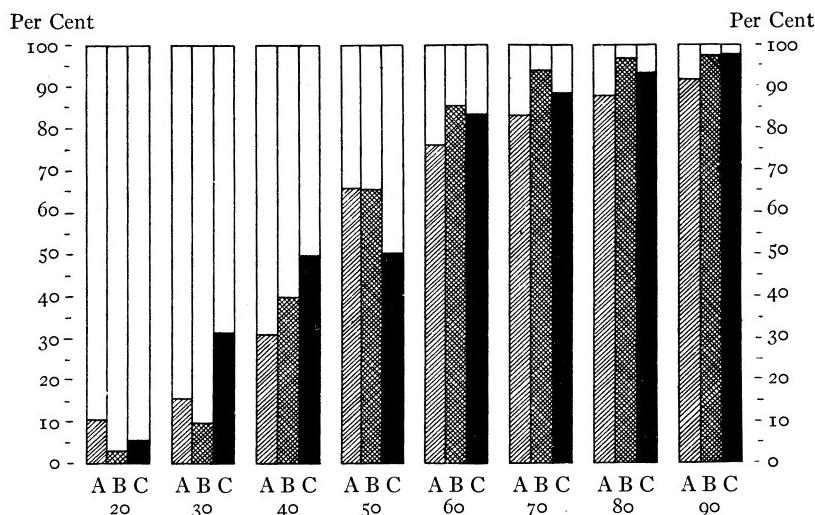


CHART 3.—Proportions of the 826 judges regarding each of the twenty-four specimens on the Ayres Measuring Scale for adult handwriting adequate for social correspondence. (Single-hatching, proportion regarding vertical specimens adequate; cross-hatching, medium-slant specimens; black, extreme-slant specimens.)

judge as well as the non-teachers the quality requisite for social correspondence, let it be said that both these groups consist of adults, that the first group is notable for the extent of its social correspondence and, therefore, at least as sensitive as any of the three groups to the social need for handwriting, and that the second group is, by virtue of its function, made up of good judges of handwriting.

*Conclusion as to the standard for social correspondence.*—The facts concerning the social demand for handwriting are now before us. The modal quality written by over a thousand people in actual social correspondence is 50 on the scale. Although the proportion writing as well as 60 is not negligible, only 13.5 per cent write better than this quality. To write better than 60 is to be in a small minority as concerns handwriting ability. Moreover, more than four-fifths of 826 judges consider the quality 60 adequate, with a generous majority approving the quality 50. In the light of these

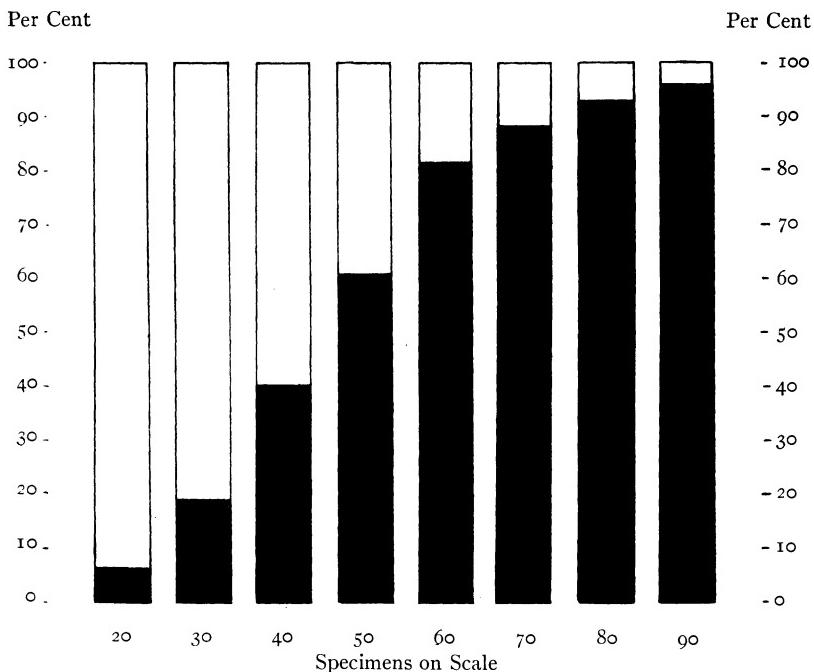


CHART 4.—Average percentages of the 826 judges considering the three specimens of each quality on the Ayres Measuring Scale for adult handwriting adequate for social correspondence. (From Table IV.)

facts, it is difficult to see why, for the use under consideration, a pupil should be required to spend the time necessary to learn to write better than the quality 60. There is even considerable justification for setting the ultimate standard at 50. As this demand touches every member of society, all the children in the schools should be required to attain the standard set.

## B. THE QUALITY OF HANDWRITING REQUISITE FOR VOCATIONS

The quality aspect of the vocational need for handwriting was studied by scoring, again on the Ayres Measuring Scale for Adult Handwriting, the handwriting done by 1,127 employees in a number of occupations listed in the left-hand columns of Tables V and VI. The assumption is that we may use the handwriting done by these employees in establishing vocational standards, because the presence in these employments of the persons writing the specimens is proof that they write well enough for the purposes of their vocations. Brief comment needs to be made concerning most of the groups listed in the tables. The printers in Table V were employees of a large printing establishment in a city of the Middle West, most of them being apprentices, but all on the pay-roll of the company, many of them earning journeymen's wages. Group 2 includes those employed through a period of years in the trade-order department of an immense wholesale establishment. The secretary of this company informed the writer that this is the sole department in which ability in handwriting is required, all other writing work being done on machines. In this connection we should not omit reference to those officers—several in number—in large business establishments who wrote the investigator in some such strain as the following: "Practically all of the written work in our offices is done on the typewriter. Some years ago most of the work was handwork, but scarcely any penmanship is used now." The work in the department under consideration consists in jotting down in pencil on cards the names and addresses of retailers buying from the wholesale company and the amounts of such purchases by months or other periods. The specimens for group 3 were collected from the work of his employees by the owner of a "string" of banks in villages and small cities. The work of these employees in country banks is not much specialized, each of them performing a variety of functions. Group 4 includes a small number of employees in the central offices of a large fire-insurance company; group 5, the hand addressers for a large publishing house, again the only employment of the company requiring the use of handwriting; group 6, the hand addressers for an addressing company employing from one hundred to two hundred persons weekly, who are paid on a quantity basis,

TABLE V  
DISTRIBUTION OF THE SCORES OF THE HANDWRITING DONE BY PERSONS ENGAGED IN CERTAIN OCCUPATIONS

OCCUPATION GROUP	TOTAL NUMBER	SCORE ON THE AYRES MEASURING SCALE FOR ADULT HANDWRITING										Average				
		20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
1. Printers*	93	...	1	13	15	20	13	6	11	6	5	1	2	...	...	49.5
2. Trade-order department in wholesale establishment	69	...	1	...	2	4	31	10	18	...	3	...	...	...	...	53.3
3. Employees in country banks	22	1	...	2	1	2	5	2	4	...	4	1	2	...	...	56.1
4. Insurance office employees	17	...	...	2	2	3	1	2	4	3	...	...	...	...	...	56.8
5. Addressers for publishing company	8	...	...	...	...	...	...	1	3	...	3	...	1	...	...	65.6
6. Addressers for addressing company	42	...	...	...	1	...	4	...	13	2	16	...	5	1	...	65.6
7. Addressers for mail-order company	272	...	...	...	1	10	12	90	26	86	30	7	...	...	...	63.0
8. In billing department of mail-order company	66	...	...	...	...	...	9	3	30	9	14	1	...	...	...	61.4
9. In check-returns department of mail-order company	85	...	...	1	4	12	8	26	10	19	3	2	...	...	...	61.0
10. Elementary-school teachers	75	...	1	...	4	4	12	7	19	5	15	7	1	...	...	59.7
11. High-school teachers	104	1	4	10	3	17	8	21	4	9	3	3	1	3	...	53.3.
12. University teachers	83	1	4	10	3	17	8	21	4	9	3	3	1	3	...	45.5

\* The specimens written by the printers were scored on the Ayres Measuring Scale for Handwriting, not on the Measuring Scale for Adult Handwriting, the latter not being available at the time the scoring of these 93 specimens was done. However, the distribution and the scores for this group may be considered comparable for practical purposes with those for the remaining groups, as the writer has found by a study of his scoring of the 42 specimens in group 6 by the former scale, within a short time after the handwriting of the printers was scored, that the average score by this scale was 56.7. This is only 1.1, or about one-ninth of a step on the scale, higher than the average as here shown for this group when scored by the Adult Scale.

TABLE VI  
DISTRIBUTION OF THE SCORES OF THE HANDWRITING DONE BY EMPLOYEES IN THE OFFICES OF TWO PACKING COMPANIES

DEPARTMENT	TOTAL NUMBER	SCORE ON THE AYRES MEASURING SCALE FOR ADULT HANDWRITING										Average					
		20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	
1. Messenger.....	29	.....	2	.....	4	1	10	3	7	4	2	1	1	1	1	1	51.6
2. Telegraphy.....	9	.....	.....	.....	.....	.....	.....	1	1	2	2	2	2	2	2	2	66.1
3. Claim.....	6	.....	.....	.....	.....	.....	.....	2	2	4	4	4	4	4	4	4	60.8
4. Credit.....	11	.....	.....	.....	.....	.....	.....	2	2	4	4	4	4	4	4	4	60.9
5. Railroad.....	14	.....	.....	.....	.....	.....	.....	2	2	4	4	4	4	4	4	4	65.4
6. Invoice.....	14	.....	.....	.....	.....	.....	.....	1	1	4	4	4	4	4	4	4	65.7
7. Accounting.....	13	.....	.....	.....	.....	.....	.....	1	1	3	3	3	3	3	3	3	66.5
8. Distribution.....	7	.....	.....	.....	.....	.....	.....	.....	.....	3	3	3	3	3	3	3	67.9
9. Bookkeeping.....	9	.....	.....	.....	.....	.....	.....	1	1	1	1	1	1	1	1	1	68.3
10. Order.....	11	.....	.....	.....	.....	.....	.....	.....	.....	2	2	5	5	5	5	5	68.6
11. Account sales.....	12	.....	.....	.....	.....	.....	.....	.....	3	3	3	3	3	3	3	3	71.3
12. Miscellaneous.....	56	.....	.....	.....	.....	.....	.....	10	8	19	3	9	3	3	3	3	61.7
13. Summary of 3-12 inclusive.....	153	.....	.....	.....	.....	.....	.....	18	12	45	5	50	9	12	2	2	64.6

and who do approximately 75 per cent of all addressing work cared for by the company. Hand addressing is again represented in group 6, which includes 272 persons in the employ of one of the largest mail-order houses of the country. The next two groups, 8 and 9, are employees in other departments of the same company. Table VI presents the scores given specimens written by the employees in the central offices of two packing companies. Where the numbers of specimens were large enough, they have been clas-

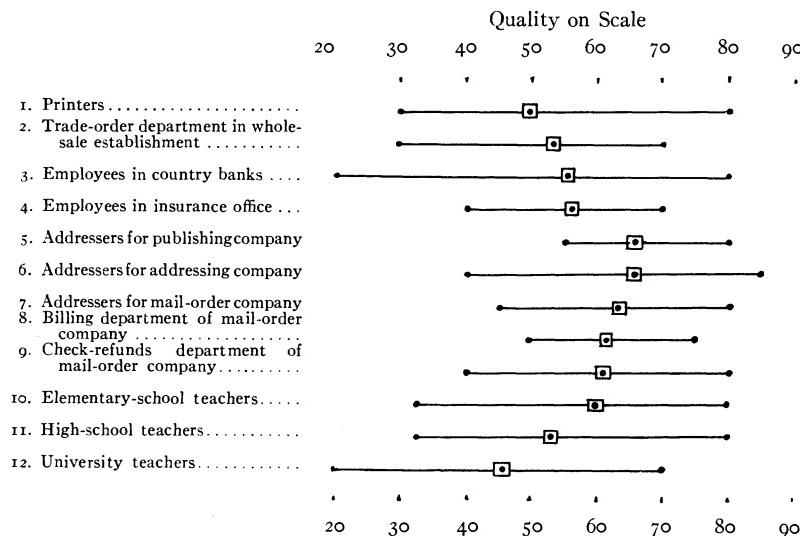


CHART 5.—Ranges and averages of the scores of handwriting done by persons in certain occupation groups. (From Table V. The lines represent the range of quality shown by the specimens; the squares on these lines locate the averages.)

sified by groups representing departments, but where the numbers of specimens representing departments have been 5 or less, they have been merged in group 12 as "miscellaneous." It will be noted that departments 1 and 2 represent employments not usually classed as clerical or business occupations, although they are associated with such occupations.

We may now turn our attention to the quality of the writing used in the occupations or vocations represented, as shown in Tables V and VI and their corresponding charts, 5 and 6. The

latter present graphically the range of quality for each of the occupations and the place of the average quality in this range. In the extreme right-hand column in the tables is given the average for the occupation. Printers write from the quality 30 to the quality 80 on the scale, the average being 49.5. Sixty-one, or approximately two-thirds of this group, write from 35 to 50 inclusive. In the series of business employments in groups 2-9 in Table V we

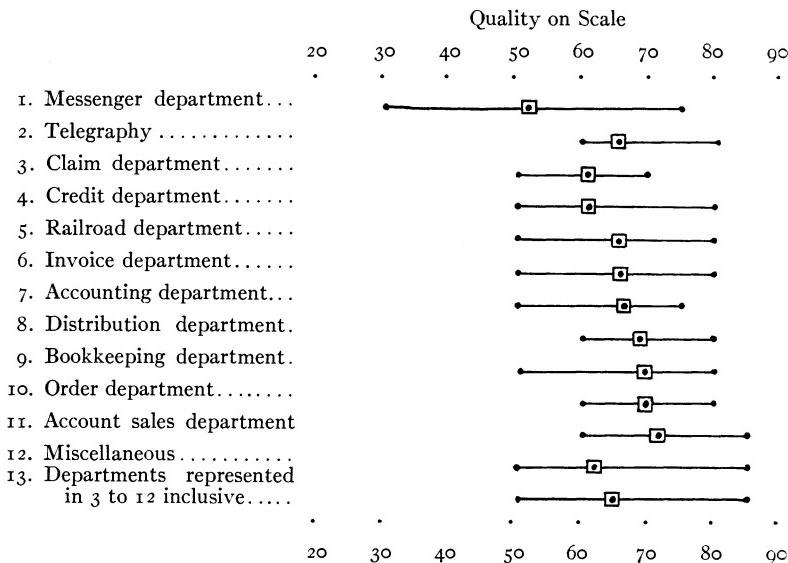


CHART 6.—Ranges and averages of the scores of handwriting done by employees in the offices of two packing companies. (From Table VI. The lines represent the range of quality shown by the specimens; the squares on these lines locate the averages.)

note a demand for a better quality of handwriting than seems to be required of those working at the trade of printing, relatively few of the specimens falling below the quality 50, with the averages for these groups ranging from 53.3 to 65.6. Large proportions of groups 5-9 write as well as 60 and 70. The facts for the teaching profession presented in groups 10, 11, and 12 supply an interesting comparison both with the other groups in this table and with one another. The distribution for elementary-school teachers is somewhat toward the upper half of the scale, only a small proportion

writing below the quality 50, and the average for the group being almost 60. This contrasts rather strikingly with the distributions and averages for the remaining two teaching groups and conforms no doubt in some measure to the fact that teachers in elementary schools are particularly concerned with the teaching of writing. Table VI and Chart 6 show that, except in the messenger service, the handwriting of no employee in these groups drops below the "deadline" set by the quality 50. In the group of telegraphers and in three of the strictly commercial occupations, viz., groups 8, 10, and 11, no one writes a quality poorer than 60. On the other hand, relatively few in any of these departments write a quality better than 70 on the scale. The averages, also, of the telegraphers and of the commercial workers are uniformly high, while the average for the entire group of 153 strictly commercial employees summarized in group 13 is 64.6, a point approximately half-way between the qualities 60 and 70 on the scale.

The reader will find it interesting and profitable at this point to compare the facts appearing in this study with the findings in an investigation made by Freeman<sup>1</sup> into the quality on the Ayres Measuring Scale for Handwriting which employers of clerical workers regarded as "essential" and "desirable" in certain occupations. With infrequent exceptions, the employers responding regarded the qualities 60 and 70 as "essential," their opinions thus conforming rather closely to the facts as found in the investigation reported upon in the present article. The exceptions are four instances of the specification of a quality lower than 60 and three higher, one of these higher being an 80 and the two remaining—for the employees of a correspondence school—90. In most instances these employers consider a higher quality "desirable."

Although the facts were gathered for the purpose of determining the ultimate standard of quality for use in social correspondence and not for the standard for vocational uses, we may now revert to Tables I and II for further light on the handwriting ability requisite in certain vocational groups. This is justified by the large probability that the individuals concerned will write the same quality

<sup>1</sup> Frank N. Freeman, "Handwriting," chap. v in the *Fourteenth Yearbook of the National Society for the Study of Education*, 1915.

in such vocational use as they may have for handwriting as they do in their social correspondence. We have already noted that the representatives of some of the professional groups write at a low average quality. As a matter of fact, they write at a lower average quality than do the skilled and unskilled laborers of this entire group of 1,053 social correspondents, as is to be seen in Table VII. In the skilled and unskilled labor group of 56 of this table have been included those reported as being farmers, dressmakers and milliners,

TABLE VII

DISTRIBUTION OF SCORES OF THE HANDWRITING DONE IN SOCIAL CORRESPONDENCE  
(a) BY SKILLED AND UNSKILLED LABORERS AND (b) BY PROFESSIONAL WORKERS

SCORE	IN SKILLED AND UNSKILLED LABOR		IN PROFESSIONS	
	No.	Percentage	No.	Percentage
20.....	1	1.8	11	9.3
25.....			5	4.2
30.....	9	16.1	18	15.2
35.....			4	3.4
40.....	13	23.2	24	20.3
45.....			4	3.4
50.....	16	28.6	24	20.3
55.....			4	3.4
60.....	14	25.0	17	14.4
65.....			3	2.5
70.....	2	3.6	3	2.5
75.....	1	1.8		
80.....			1	0.8
Total.....	56	100.0	118	99.7
Average score.		47.6		43.1

laborers, mechanics, telephone operators, electricians, housekeepers, railroad employees, ranchers, sailors, hairdresser, shipfitter, dairyman, carpenter, miner, and janitor. In the professional group of 118 (exclusive of educational workers) have been included lawyers, nurses, engineers, physicians, authors and journalists, clergymen, musicians, librarians, Y.M.C.A. and Y.W.C.A. workers, artists, chemists, social workers, dramatic reader, agricultural-extension worker, college recorder, dentist, architect, etc. The averages of the qualities written by these two groups are, respectively, 47.6 and 43.1. The modal quality for each group is 50.

A considerable proportion of both groups—more of the laborers than of the professional workers—write as well as the quality 60, but very few of either group exceed it. One is led to conclude that for vocational uses neither laborers nor professional workers (other than educational workers) have need to write a quality better than 60.

*Conclusions as to the standards for vocational uses.*—From the facts that have been presented touching the ability in handwriting of persons engaged in various occupations it seems to the writer that *the quality 60 on the Ayres Measuring Scale for Adult Handwriting which we have set up as the ultimate standard of attainment for all school children for purely social purposes is adequate for the needs of most vocations.* This will apply to labor, skilled and unskilled, as well as to the professions, exclusive of teaching in the elementary schools. For that large group who will go into commercial work, for telegraphers, and for teachers in the elementary schools it will be necessary to insist upon the attainment of a somewhat higher quality, but hardly in excess of the quality 70. The fact that some will go into pursuits demanding a quality better than 60 should not be offered as a justification for requiring all pupils to attain that better quality. Such a requirement would entail the waste of a vast amount of time on the part of both teachers and pupils. Who shall be taught this better quality is a problem of educational and vocational guidance. Since all should be required to learn to write as well as 60 on the scale for the purely social uses, to train pupils to write this quality is the task of *general* education; to teach some who are going into commercial or other vocations requiring a higher quality of handwriting to write this better quality is the task, not of general, but of *vocational*, education. Many high-school commercial departments have long since recognized this distinction by giving special training in handwriting to those enrolled in their work.

In an investigation into the handwriting abilities of the pupils in the elementary schools of a number of large cities a few years ago Freeman<sup>1</sup> found the average score on the Ayres Measuring Scale for Handwriting in the eighth grades to be 62.8. Assuming the corresponding qualities on the Measuring Scale for Handwriting

<sup>1</sup> *Loc. cit.*

and the Measuring Scale for Adult Handwriting to be equivalent—which doubtless is true for practical purposes—we may conclude that the average city school is teaching the average child to write amply well. However, as this is the average, there must be many children in many cities who are not learning to write well enough and many others who learn to write too well. It has already been stated above that the standard is one for *all* children to attain; it is not one to be attained as an average for a class or school or system. When a child has attained the standard quality, his time should be devoted to the attainment of some other skill or knowledge for which he has need. The attainment of such a standard by all children of the public schools will make it possible for the schools to escape much of the unfavorable criticism to which they are now subjected because of the handwriting done by those among their product who write too poorly, i.e., below the quality 60 on the scale.

#### CONCERNING THE RELIABILITY OF THE CONCLUSIONS OF THIS STUDY

Among the questions concerning the validity of the conclusions of this study that may arise is this: May the scoring done by the writer be depended upon to be representative, or does it deviate so widely from that done by others as to invalidate the conclusions drawn? To settle this point the writer has recently scored 140 specimens of handwriting for which Dr. Frank N. Freeman has obtained standard scores. The method of arriving at these standard scores will first be briefly described. The specimens were graded separately by three persons, each of whom had made extensive experiments with the Ayres Measuring Scale for Handwriting. On all the specimens on which there was agreement this score was taken. When there was disagreement, the graders had a conference and arrived at a score upon which they could agree. In some cases Dr. Freeman made a final revision after a conference with one of the graders. From a practical point of view, the scores arrived at in this manner should be reasonably reliable. The average of the standard scores of the 140 specimens is 47.3. The writer has found the averages of his scores of these specimens on both the Measuring Scale for Handwriting and the Measuring Scale for Adult Hand-

writing to be 48.5 and 47.6, respectively. Thus, the scoring done on the former scale by the writer tends, on the average, to be slightly higher than the average of the standard scores. The difference is but 1.2, or less than one-eighth of a step on the scale—for practical purposes a negligible deviation. The average score on the Measuring Scale for Adult Handwriting, the scale used in the investigation reported in this article, is seen to deviate even less from the average of the standard scores. The summary of the deviations in scoring by the adult scale is presented in Table VIII.

TABLE VIII  
DEVIATIONS FROM STANDARD SCORES IN SCORING 140 SPECIMENS OF  
HANDWRITING

Deviation from Standard Score	Number of Specimens
0	32
- 5	33
+ 5	25
- 10	17
+ 10	16
- 15	5
+ 15	9
- 20	1
+ 20	1
+ 25	1
Total number	140

It is to be noted that for the scores of 90, or almost two-thirds, of the specimens there was either no deviation or a deviation of only half a step on the scale. In 33 cases there was a deviation of a full step on the scale and in only a small proportion of cases more than a step. Furthermore, the deviations above and below the standard scores are approximately equal in number. Exception may hardly be taken to the conclusions drawn on the ground of unrepresentative scoring.

Another question refers to a possible deterioration in quality of handwriting after the pupil leaves the elementary school and either becomes a student in the high school or does not continue his education beyond the elementary school. If the quality of handwriting tends to deteriorate after acquisition, will it not be necessary, it

may be asked, to teach a quality higher than the standard here proposed in order to allow for deterioration down to the requisite quality? Such evidence as is presented at this point, although not sufficiently extensive to establish beyond a doubt the fact of maintenance, points definitely in that direction. The situation as it concerns deterioration or maintenance of quality in handwriting in the high school may be illustrated by the findings of an investigation made in the Lincoln High School<sup>1</sup> of Seattle. The writing done by Freshmen and Seniors in classes in English was scored on the

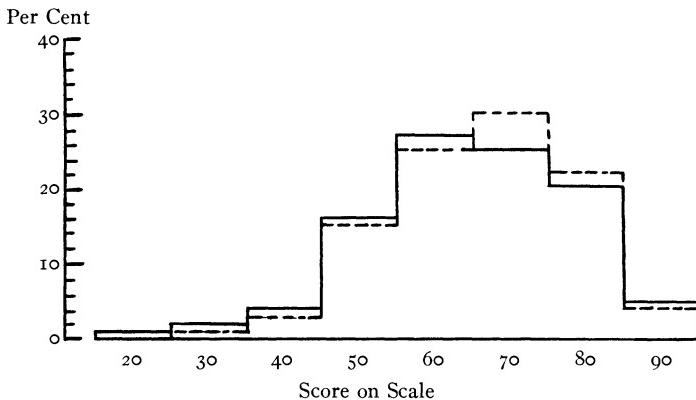


CHART 7.—Distribution of the sources of the handwriting done in English classes by high-school Freshmen and Seniors. (Solid line shows distribution for Freshmen; broken line, for Seniors.)

Ayres Measuring Scale for Handwriting, the percentage distributions of the scores being as shown in Chart 7. Computed on these percentage distributions the averages for Freshmen and Seniors are, respectively, 64.6 and 66.2. Both the percentage distributions and the averages indicate improvement, although it is not large in amount. While the proper test would be, not the scoring of the handwriting of Freshmen and Seniors of any one semester or school year, but of the specimens of the handwriting of the same pupils as Freshmen and again as Seniors, three or four years later, yet we are

<sup>1</sup> For the use of the facts here cited acknowledgment is made to Frederick E. Clerk, formerly principal of the Lincoln High School, now assistant superintendent of schools, Cleveland, Ohio.

probably safe in concluding that there is no tendency toward deterioration of quality of handwriting in the high school.

With the aim of detecting deterioration in quality of handwriting done by persons who have left school the writer has scored the handwriting done in social correspondence by 27 boys who left school in seventh, eighth, or ninth grade. All of these boys went into employments requiring no or very infrequent use of handwriting. For each boy two specimens were available, one written shortly after his leaving school and another written from two to five years subsequent to the writing of the former. The average of the scores of the earlier and of the later specimens are, respectively, 52.8

TABLE IX

CHANGES IN QUALITY OF HANDWRITING FOUND IN 27 PAIRS OF SPECIMENS  
WRITTEN BY BOYS WHO HAVE LEFT SCHOOL

Change in Quality	Number of Cases
0	10
+ 5	9
+ 10	3
- 5	3
- 10	2
Total number	27

and 54.3. The changes in quality shown in the 27 pairs of specimens are presented in Table IX. Although 27 cases are too few from which to draw an indubitable conclusion, we note again, as in the case of students in high school, no tendency toward deterioration of quality of handwriting.

We are also justified in asking whether the investigation has been sufficiently extensive to solve finally the problem of ultimate standards of quality in handwriting for the public schools. We shall need to be ready, of course, to defer to conclusions drawn from more and better facts than have here been presented. It must be admitted, also, that facts concerning certain occupations left unexplored by the present investigation may lead to a modification of the conclusions as to standards requisite for vocational uses. But it should be kept in mind that the specimens of social correspondence used were for the most part those written by the better

educated of the middle-class Americans, that the judgments concerning adequacy and inadequacy of the specimens on the scale were likewise those of the better educated and more educationally interested, and that the numbers of specimens used in the study of both the social and the vocational needs were by no means small.

To those now contending for scientific method in curriculum-making there will be little question as to the appropriateness of the method of this investigation—that of studying social and vocational uses to assist in discovering how well we should be taught to write. We should not lose sight of the fact that these persons whose handwriting has been scored would be writing a better quality than here shown were social and vocational pressure emphatically in that direction; they may be said to be meeting the demands for handwriting that are being made upon them. Also, the standards set are not those of the minimum quality found, nor even the mode or average, but that of the highest large group found in the distributions, although there is considerable justification for the acceptance of some such point as the mode or average as the standard. Certainly, the facts presented are not less than material testimony for the problem of standard-setting.